

ABSTRACT

METHOD AND APPARATUS FOR PROVIDING SYNCHRONOUS DATA TRANSMISSION BETWEEN DIGITAL DEVICES OPERATING AT FREQUENCIES HAVING A P/Q INTEGER RATIO RELATIONSHIP

An apparatus for synchronously transmitting data between devices operating at different frequencies that have a P/Q integer ratio relationship. The apparatus allows one or more device(s) operating at a high frequency to synchronously exchange data with one or more device(s) operating at a low frequency. The low and high frequencies have a P/Q integer ratio relationship of:

$$\text{low frequency} = (P/Q) \times \text{high frequency};$$

where P and Q represent integer values, P is less than Q, and Q is not necessary an integer multiple of P. A P/Q clock generator generates one or both of the high and low frequency clocks according to the P/Q frequency ratio. An interface controller receives the high frequency clock and the P and Q values as inputs and generates a high-to-low data transfer signal for enabling data transfers from high frequency to low frequency devices. The interface controller also generates a low-to-high frequency data transfer signal for enabling data transfers from low to high frequency devices. The data transfer signals may be used to latch or qualify transfer data during transfer across frequency boundaries. The data transfer signals indicate safe times, or windows, for transferring data across frequency boundaries. A safe time for transferring data across a frequency boundary is a high frequency clock period where the transfer data is stable and the receiving device can receive the data.

